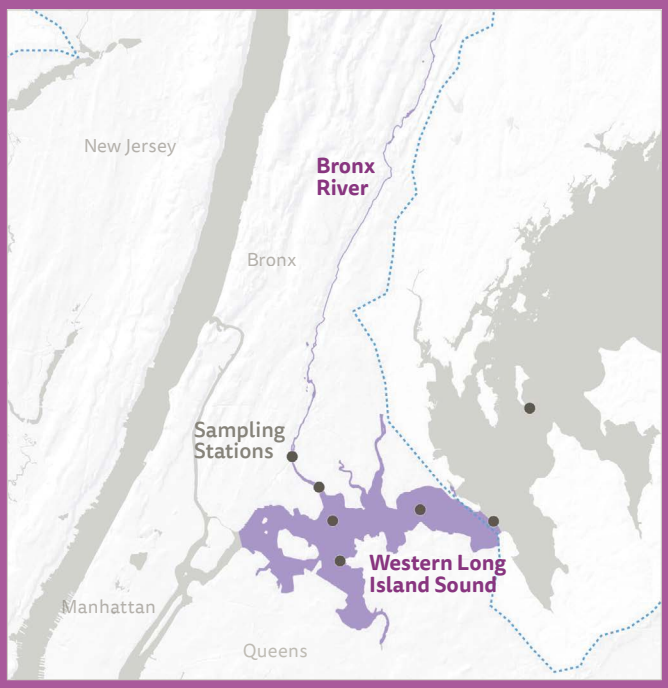
Regional Waterbody Summary
The Bronx River and Western Long Island Sound

The Bronx River runs south from White Plains, NY, emptying into the Western Long Island Sound and the Upper East River. Included in this region are the New York City Boroughs of the Bronx and Queens, as well as parts of Westchester County. An industrial thruway with a history of exposure to raw sewage, the Bronx River faces serious challenges with managing pollution and contamination. The Western Long Island Sound and its other tributaries have similar issues. Popular waterfront parks include Soundview and Concrete Plant Park in the Bronx and the Flushing Bay Promenade in Queens.

Major factors influencing water quality in this region include CSOs, municipal discharges/sewage, industrial point source discharge, stormwater runoff, spills and unpermitted discharges, streambank erosion, habitat alteration, and flow alterations from water diversions. The state reports to EPA through their 303(d) and 305(b) impairments to aquatic life, fish consumption, public bathing, recreation, and shellfishing. Use of these public resources has been lost due to low dissolved oxygen, fish passage barriers, floatables, pathogens, and nitrogen. The state 303(d) and 305(b) reports to EPA also indicate that assessments of TMDLs are needed for the Upper Bronx River, while alternative controls to be implemented through Long Term Control Plans (LTCPs) have been identified to address dissolved oxygen levels, floatables, and pathogens throughout the Middle and Lower Bronx River. For the Upper East River and Western Long Island Sound, alternative controls identified in the LTCPs will address pathogens and floatables while additional monitoring efforts in the Western Long Island Sound will help address dissolved oxygen levels.



Waterbody	Water Class 6 CRR-NY 703.3 & 6 CRR-NY 703.4	Water Quality Criteria	
		Pathogenic Bacteria (cfus/100mL)	**Dissolved Oxygen** (mg/L)
Bronx River	Class I: Fishing and Boating	Fecal Coliform: Monthly GM ≤ 200 from 5 or more samples	Never < 4.0
Upper East River to the Western Long Island Sound	Class SB: Bathing	Fecal Coliform: Monthly GM ≤ 200 from 5 or more samples	Never < 3.0
		Enterococcus: Monthly GM ≤ 35 and single sample max > 130	

Water Quality Monitoring in the Harbor Estuary

This regional waterbody summary, prepared by the New York-New Jersey Harbor and Estuary Program (HEP) and partners, provides a brief analysis of select water quality data to illustrate the progress toward achieving the fishable and swimmable goals of the Clean Water Act in the Bronx River and Western Long Island Sound. It is a companion to HEP's 2021 *Harbor-Wide Water Quality Monitoring Report* (available at www.hudsonriver.org/harborwidewqreport-2021), which presents water quality data collected from 2010 to 2017 from both New York and New Jersey across all 10 different regions of the Harbor Estuary. The full report analyzes four water quality parameters against federal recreational water quality recommendations and guidance documents as well as state water quality standards and criteria, and discusses achievements to date and efforts still needed to achieve fishable and swimmable waters.

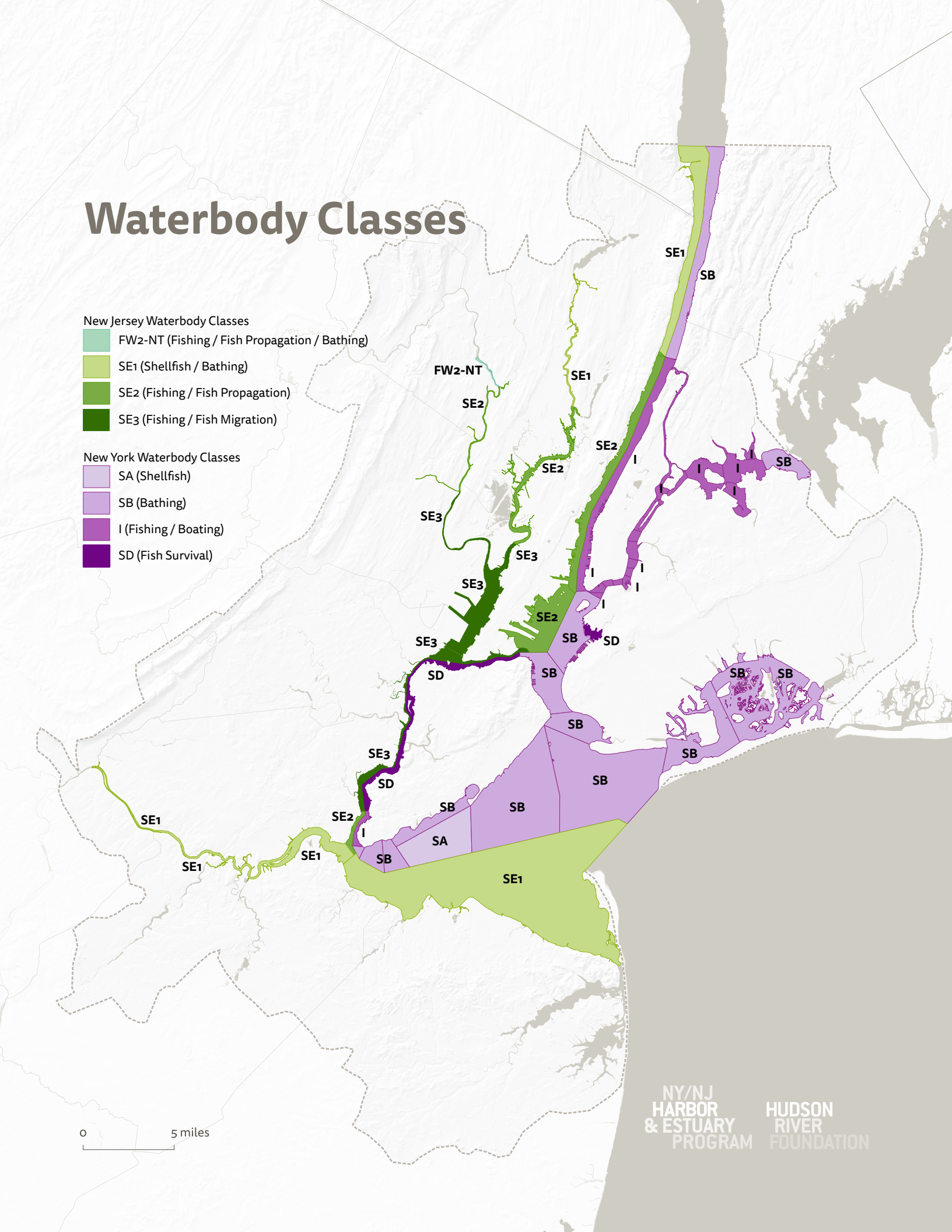
This regional waterbody summary describes water quality and key challenges and opportunities for improvement relative to New York's and/or New Jersey's state standards and criteria as of 2020 for pathogenic bacteria (e.g. fecal coliform, *Enterococci,* and *E. coli*) and dissolved oxygen. In the case where multiple water quality standards and criteria are used in a regional waterbody, the highest criteria that is supportive of primary or secondary contact is displayed as the threshold. For swimmable waters, pathogen levels must meet a state's criteria and designated use (i.e., supporting secondary or primary contact recreation). The potential future standard of *Enterococcus* is also discussed where applicable. For fishable waters, dissolved oxygen levels must meet and/or exceed the state's criteria and levels of total nitrogen and chlorophyll-*a* must show at least fair conditions to support aquatic life. Potential investments and opportunities for improvement are showcased, including the National Pollutant Discharge Elimination System (NPDES) and Long Terms Control Plan (LTCP) permits used by the states of New York and New Jersey to reduce pollution and ensure designated uses of each waterbody are met. Total Maximum Daily Loads (TMDLs) are another tool used by the states and EPA to determine the amount of a pollutant that a waterway can take in and still meet their designated uses and water quality criteria.

Data presented were collected primarily between June 1 and September 30, and compiled from two comparable harbor surveys conducted by the New York City Department of Environmental Protection (NYCDEP) and by the New Jersey Harbor Dischargers Group (NJHDG). As available, select secondary data sources were used to complement results from these two primary data sources. More information on data analysis methods can be found in the full report.

The full report and this regional waterbody summary does not serve to replace New York's or New Jersey's Integrated Water Quality Reports, nor are they meant to be used for compliance purposes. Proposed rulemaking to amend standards and/or criteria introduced by the states are also not explored in this report.

Photo: Rob Buchanan, Billion Oyster Project

Waterbody Classes

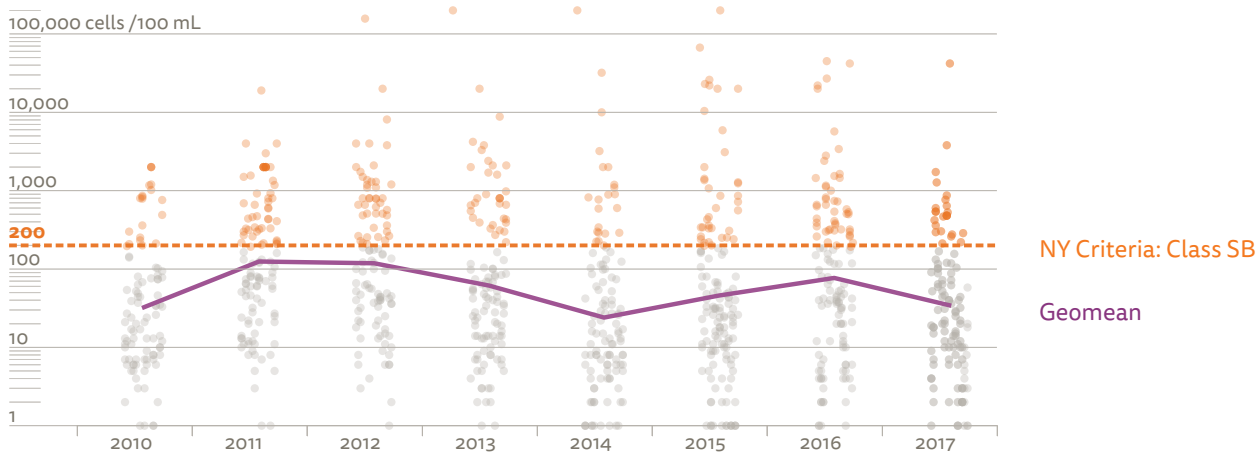


Pathogens

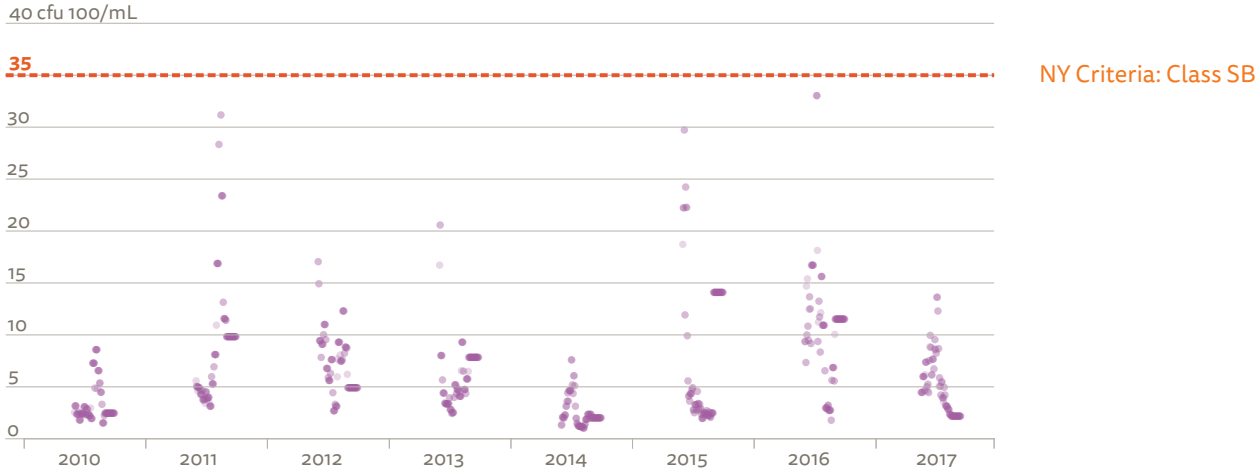
The presence of pathogenic bacteria can limit recreational use of these waterways. Sampling data show improvement over time to support secondary contact recreation, though discrete samples do vary throughout the region and still limit primary contact recreational activities, like swimming. The geometric means of samples from the Bronx River and Western Long Island Sound region show compliance when it comes to Class I and Class SB criteria for fecal coliform. Samples tested for *Enterococcus* criteria, applicable only in the Western Long Island Sound, show more variability over time and were out of compliance in 2011 and 2016.

The fecal coliform summer discrete measurements ranged from 1 cfu/100mL to 200,000 cfu/100mL over the eight-year period. With an average of 137 discrete samples per recreational season each year (June-September), the average geomean for fecal coliform in this region is 65 cfu/100mL. *Enterococcus* summer geometric means ranged from 1.04 cfu/100mL to 84.7 cfu/100mL over the same periods. Out of over 1,000 samples, the average geomean of *Enterococcus* for this region is 7 cfu/100mL and 10.9% of discrete samples exceeded the single sample maximum (> 130 cfus/100mL) of the *Enterococcus* criteria.

Fecal Coliform, Surface Summer Mean and Discrete Samples



Enterococcus, 30 Day Moving Geomean



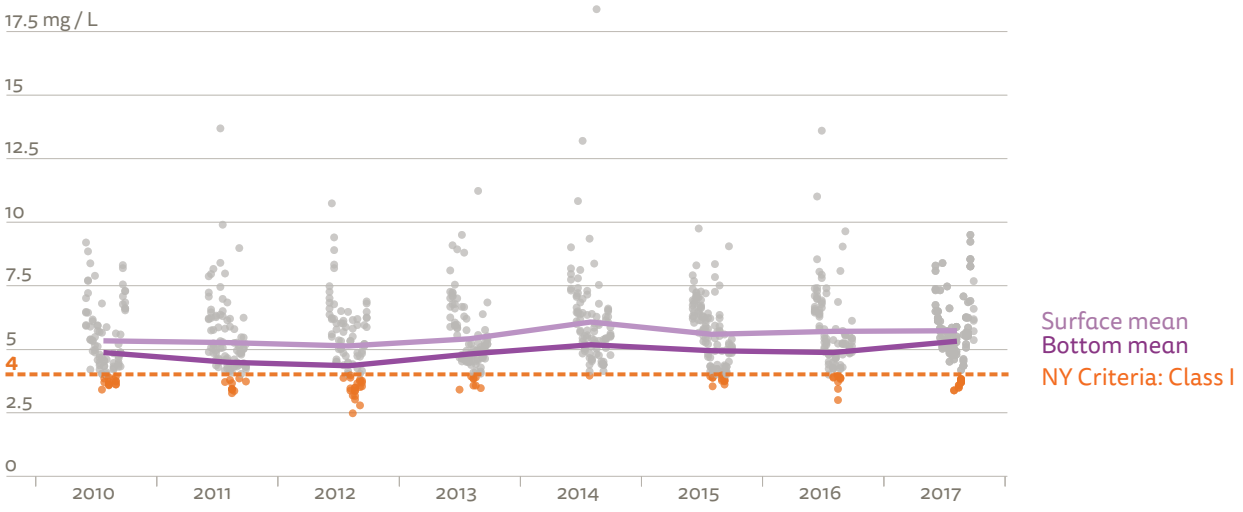
Dissolved Oxygen

Dissolved oxygen (DO) is a critical measure of habitat quality for fish and other wildlife. It is measured at the surface, where sunlight can penetrate to generate photosynthesis, as well as at the bottom, where sunlight is less available. In general, bottom DO concentrations are consistently lower than surface DO concentrations. Compliance with DO criteria has varied. Fish in this region are consistently stressed as indicated by the low discrete sample values recorded over the eight years. For example, in 2017, the Bronx River was in full compliance with the criteria while samples from the Western Long Island Sound were not. The percent of time DO samples were less than 4 mg/L was between 1-20% for surface DO and 11-40% for bottom DO. The percent of time DO samples were less than 5 mg/L has been between 22-52% for surface DO and 45-58% for bottom DO.

The data presented are from the New York City Harbor Survey, conducted by the NYCDEP. The Interstate Environmental Commission (IEC) has also been monitoring approximately 22 sampling stations in the Upper East River and Western Long Island Sound. Samples from the two data sources are reasonably consistent in their characterization of the region. However, the data collected by IEC shows more severe conditions in the Western Long Island Sound between 2015 and 2017. For example, in 2015, the percent of bottom DO samples that were less than 4.8 mg/L near NYCDEP's Upper East River stations was 45%, while the IEC stations for the same period was 72%.

	Data Source	Average Bottom DO (mg/L)	% samples < 4.8 mg/L	Min. Bottom DO (mg/L)
2015	IEC	4.1	72	2.2
2015	NYCDEP	4.9	45	2.2
2016	IEC	4.4	60	1.4
2016	NYCDEP	4.9	40	2.2
2017	IEC	4.7	47	1.5
2017	NYCDEP	5.7	33	2.6

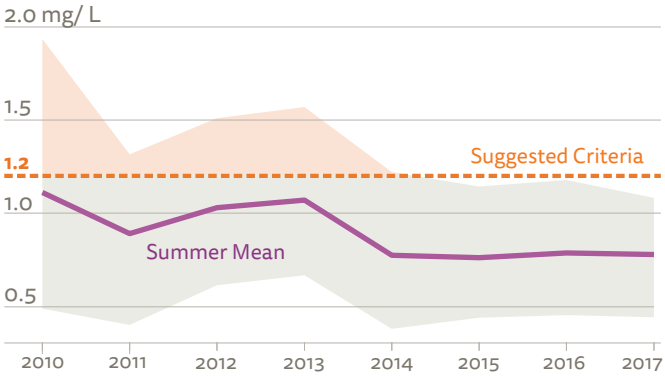
Dissolved Oxygen, Summer Mean, Surface and Bottom



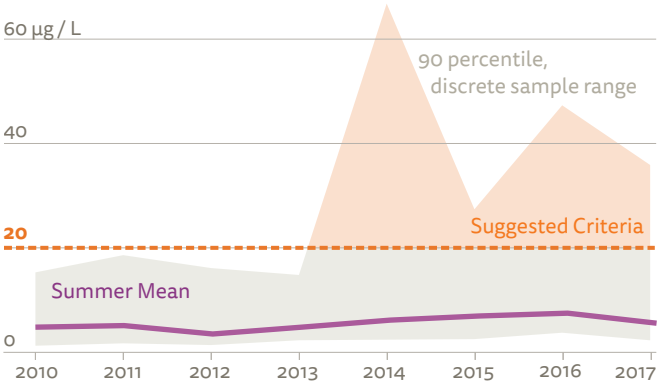
Other Water Quality Parameters

While pathogenic bacteria and dissolved oxygen are the primary criteria used to set water quality standards in New York, measurement of total nitrogen and chlorophyll-*a* provide additional information as to possible causes of low DO as well as the presence of photosynthetic algae and algal blooms. Between 2010 and 2017, the summer means for total nitrogen ranged between 0.76 and 1.11 mg/L, though daily values fluctuated over time. Total nitrogen levels between 0.4 and 1.2 mg/L is ndicative of fair conditions, and water quality would improve with nitrogen levels equal to or below 0.4 mg/L. Chlorophyll-*a* in this region shows great fluctuation over time, with high levels beginning in 2014. Concentrations of 5 µg/L or below support healthier habitats for fish survival and propagation, while concentrations at or above 20 µg/L indicate increased algal growth. Concentrations of chlorophyll-*a* during the summer season, where blooms are typically seen, are largely found to be above 20 µg/L.

Total Nitrogen, Summer Mean



Chlorophyll-*a*, 90th percentile Surface



Investments and Opportunities for Improvement

EPA and New York State have identified CSOs as a key source of pathogenic bacteria (and other pollutants) that limit recreational use. There are six Long Term Control Plans (LTCPs), developed by NYCDEP and submitted to NYSDEC, to address this issue. Plans for Alley Creek, Hutchinson River, Flushing Creek, Flushing Bay, Bronx River, and Westchester Creek have been approved by NYSDEC and improvements to the sewer system are underway. Additional green infrastructure, chemical disinfection of discharge using chlorination, floatables control programs, and storage tunnels or tanks to allow for treatment should result in significant improvements by reducing CSO volume discharged into these waterbodies and therefore reducing the presence of pathogenic bacteria. A combined pre-LTCP and LTCP-approved investment of approximately $2.8 billion will reduce CSO volume from 11% in the Hutchinson River and 63% in Westchester Creek in the decades to come (NYCDEP, 2020).

The Western Long Island Sound is included in New York City's Citywide and East River/Open Water LTCP, submitted to the state in 2020. Preliminary planning suggests the optimization of CSO regulators as well as the implementation of CSO storage tunnels. With the implementation of all the LTCPs, there will be a reduction in CSOs and discharge of pathogens through the next several decades. LTCPs in New York City also require implementation of green infrastructure projects such as rain gardens, which potentially reduce levels of nutrient loading and total suspended solids from stormwater runoff. In addition, New York City received its first MS4 permit in 2015 which enables NYCDEP and other city agencies to further implement measures to reduce pollutants in stormwater runoff. To improve water quality for fish propagation and survival as well as reduce the occurrence of algal blooms, further efforts are needed to address nutrients, such as nitrogen, and chlorophyll-*a* levels in this region. Monitoring and modeling efforts now underway through the efforts of Long Island Sound Study and NYCDEP will determine the best path forward.